

(19) **United States**

(12) **Patent Application Publication**
Saito et al.

(10) **Pub. No.: US 2019/0155003 A1**

(43) **Pub. Date: May 23, 2019**

(54) **OPTICAL SYSTEM AND IMAGING APPARATUS INCLUDING THE SAME**

Publication Classification

(71) Applicant: **CANON KABUSHIKI KAISHA**,
Tokyo (JP)

(51) **Int. Cl.**
G02B 13/02 (2006.01)
G02B 7/04 (2006.01)
G02B 7/02 (2006.01)
G02B 27/00 (2006.01)
G02B 15/16 (2006.01)

(72) Inventors: **Shinichiro Saito**, Utsunomiya-shi (JP);
Makoto Nakahara, Utsunomiya-shi (JP);
Suguru Inoue, Utsunomiya-shi (JP);
Akira Mizuma, Utsunomiya-shi (JP);
Masakazu Yamagishi, Saitama-shi (JP)

(52) **U.S. Cl.**
CPC **G02B 13/02** (2013.01); **G02B 7/04** (2013.01); **G02B 15/16** (2013.01); **G02B 27/0025** (2013.01); **G02B 7/021** (2013.01)

(21) Appl. No.: **16/178,364**

(22) Filed: **Nov. 1, 2018**

(30) **Foreign Application Priority Data**

Nov. 20, 2017 (JP) 2017-223150

(57) **ABSTRACT**

An optical system includes a first lens unit B1 having a positive refractive power, a second lens unit B2, and a third lens unit B3 disposed in order from an object side to an image side. The second lens unit B2 moves in focusing so that an interval between adjacent lens units among the first, second, and third lens units changes. The first lens unit B1 includes a positive lens G1_p disposed closest to the object side and a negative lens G1_n being a closest negative lens with respect to the object side. The optical system satisfies a predetermined condition.

